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THEATER NUCLEAR WEAPONS - ARE THEY REALLY AN OPTION FOR AN OPERATIONAL COMMANDER?

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Joint Military Operations Department.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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ABSTRACT OF

THEATER NUCLEAR WEAPONS - ARE THEY REALLY AN OPTION FOR AN OPERATIONAL COMMANDER?

The September 1994 approval of the Nuclear Posture Review (NPR) reaffirmed the current posture of non-strategic nuclear forces (NSNFs) for use by operational commanders. Joint U.S. military doctrine firmly places the responsibility for intelligent employment of theater nuclear weapons on the operational commander. The revival of operational art in professional military education has made us aware that nuclear weapons have, over the past several decades, appeared to make operational art irrelevant. Alternately, it could be asserted that effective use of operational art may obviate theater nuclear weapons.

Analysis of whether theater nuclear weapons are still useful warfighting tools for an operational commander in the context of effective operational art, particularly the tenets of operational design, reveals the many detriments which must be overcome if theater nuclear weapons are to be successfully employed. When scrutiny is applied to the commander's original desired end state relative to the conditions following limited use of nuclear weapons, it is determined that orderly war termination would be virtually impossible.

Many aspects of modern warfighting on and around a nuclear battlefield have not been sufficiently resolved to allow confident employment of theater nuclear weapons as a mere subset of a major operational plan. When compared to the operational advantages of employing theater nuclear weapons, the detrimental effects of these weapons seriously limit their battlefield effectiveness. Overall, the negative effects on the operational commander's ability to affect an orderly war termination and achieve national strategic and military strategic objectives in his theater, particularly in today's coalition-based environment, will heavily outweigh potential advantages.

TABLE OF CONTENTS

"The employment of theater nuclear force weapons must be capable of favorably altering the operational situation to the advantage of the user....The combatant commander has the pivotal role in deciding how to best employ theater nuclear resources."[1]

Joint Pub 3-12

INTRODUCTION

In September 1994, President Clinton approved the recommendations of the Pentagon's Nuclear Posture Review (NPR), which studied the projected use of nuclear weapons into the next century and determined the minimum number of assets necessary to meet all national strategic goals. The NPR also reaffirmed the current posture and deployment of non-strategic nuclear forces (NSNFs) for use by operational commanders.[2] However, the procedures necessary to implement and frequently exercise this capability are extensive and thus are wasting valuable resources by distracting nuclear-capable forces from critical strategic nuclear or conventional war-fighting training. Furthermore, incremental reduction in total nuclear assets coincident with arms reduction treaties makes judicious employment of remaining forces imperative.[3]

As illustrated by the introductory quote, joint doctrine places the responsibility for intelligent employment of theater nuclear weapons[4] squarely on the shoulders of the operational commander.[5] The revival of operational art in professional military education has made us aware that nuclear weapons have, over the past several decades, appeared to make operational art irrelevant: "The [post-World War II] decline in operational thinking in the U.S. and the West was due to several factors. Probably the most important was the belief that because of nuclear weapons and ballistic missiles, there would be no need for large conventional operations."[6] Alternately, it could be asserted that effective use of operational art may obviate theater nuclear weapons: "Methods of operational art and new weapons have evolved to the point at which strategic aims can be accomplished on a theater-wide scale, and without nuclear weapons."[7]

This paper will address the later concept--whether theater nuclear weapons are still useful warfighting tools in the context of effective operational art--by analyzing the potential utility of these weapons for an operational commander with respect to the tenets of operational design.[8] Most existing guidance and prior research only briefly warn that collateral damage should be considered and minimized, but fail to probe the possibility that such collateral damage[9] may have such a negative impact on friendly forces as to negate the advantage of theater use of nuclear weapons. This paper will address that possibility, with greatest scrutiny applied to the desired end state of the conflict and whether the conditions following limited use of nuclear weapons would allow orderly war termination in consonance with national military objectives short of total and unconditional surrender of the enemy at all costs.

ASSUMPTIONS

By simple virtue of the fact that theater nuclear weapons are inextricably weapons of mass destruction, believed to be prone to cause escalation, the first step in their employment --obtaining release authority--may be insurmountable and prevent their use. Some argue, based on this fact alone, that maintaining the capability for their use is futile: "Their massive destructive power and the lack of control in preventing escalation render TNWS [tactical nuclear weapon systems] 'quiescent'; and developing doctrine for TNWS warfighting is abhorrent because political objectives could never justify the use of TNWS."[10] Thomas Dowler and Joseph Howard further contend that the sheer destructiveness of our current inventory may "self-deter" policy makers from ever using them.[11] Still others maintain that the time necessary for a "reactive" request to use theater nuclear weapons to return appropriate permission may make these weapon systems so unresponsive as to significantly reduce their effectiveness.[12]

Nevertheless, it is assumed for the purpose of this paper that blanket release authority for nuclear weapons has already been provided by the National Command Authority (NCA) and

the decision rests with the operational commander to employ the weapons in his arena. An alternate approach would be to study the factors such a commander must consider prior to requesting the use of theater nuclear weapons; however, assuming release authority has already been granted affords a greater opportunity to examine the utility of theater nuclear weapons employment in view of the inherent negative consequences.

DISCUSSION

Discussion will focus on two major areas - first a description of the most likely military scenarios in which theater nuclear weapons might be employed and, second, an analysis of the consequences of their use in view of operational design.

Theater Nuclear Weapons Employment Scenarios

Three major groups of scenarios are possible: offensive (or "first strike"), planned defensive and forced defensive (or "reactive").

Offensive Use of Theater Nuclear Weapons. The offensive use of theater nuclear weapons offers much to the operational commander in terms of operational design. Although generally considered abhorrent, offensive first use of theater nuclear weapons to seize a decisive victory is within joint military doctrine. Joint Publication 3-12 states that "Planning [for use of theater nuclear weapons by combatant or component commanders] should also encompass recommendations for response to ... an operational-level situation offering potential for conflict termination."[13]

One scenario may be use of theater nuclear weapons as a form of operational fire which, if used before or at the commencement of major operations, would sequentially shape the

battlefield to the commander's desires. Much more destructive than precision guided munitions (PGMs), the sheer force of theater nuclear weapons easily compensates for one of PGMs' strongest criticisms - their meager destructive power. While PGMs may be useful in the destruction of a single surface-to-air missile (SAM) installation, aircraft hangar or runway (verifiable only after extensive battle damage assessment (BDA)), the destructive force of a single theater nuclear weapon can eliminate entire airfields, industrial complexes, infrastructure nodes (e.g. power plants, telecommunications relays, etc.), ports or fortified command and control (C^2) centers, without the need for extensive BDA. Furthermore, the destruction caused by a theater nuclear weapon is more extensive, more permanent and less prone to immediate repair than the surgical strike of a PGM.

A second postulated scenario may be the use of theater nuclear weapons to assist in the concentration (application) of force at the point of main attack while not hazarding one's own center of gravity. For example, if it has been ascertained that the only viable method for attacking an adversary is to conduct a major amphibious landing at a conspicuous beachhead, theater nuclear weapons could be used to hold counterattacking forces at bay by striking both enemy defenses and intervening territory to prevent his reenforcement or operational maneuver while the landing force generates the necessary combat power to advance.

In addition, there are numerous applications in which theater nuclear weapons could be employed to effectively enhance all forms of fires if no restraints were ascribed to their use.

Planned Defensive Use of Theater Nuclear Weapons. Of course, the ability to employ theater nuclear weapons to annihilate entire divisions or corps of an advancing army in a single attack cannot be discounted. This obvious and potent capability led to NATO's planned defensive use of theater nuclear weapons as the force multiplier in the European Theater. Employing fiscal frugality on a grand, multi-national scale, NATO was able to field a credible deterrence to overwhelming Warsaw Pact conventional forces by basing relatively cheap nuclear weapons

(compared to large conventional armies) in the theater.[14] However, it can be said that planned defensive utilization may suffer from the same self-deterrence as first-strike use:

> While the United States has maintained a general policy of nuclear response in the face of such overwhelming conventional opposition as an overrun of NATO forces in Western Europe by the Soviets and Warsaw Pact forces, many Americans never have been comfortable with this position....Many authors have argued that using nuclear weapons to thwart a conventional attack was an idle threat. They contend that the United States would never risk the retaliation of Soviet ICBMs on American cities for the sake of Western Europe or American lives on foreign soil. The French initiated their own nuclear program because of this very logic.[15]

Indeed, both first-strike and planned defensive utilization of theater nuclear weapons have proven unpalatable in the past several decades. An excellent example of the non-viability of the "perfect" offensive nuclear weapon is the demise of the family of enhanced radiation weapons (ERWs), popularly known as the "neutron bomb."[16]

In all military missions in which the objective could more easily be achieved by destroying the people, and not the things, with enhanced radiation and reduced blast effects, the neutron bomb appeared to be the best weapon. It allowed the user to instantly kill his opponent, then immediately use captured equipment, infrastructure and facilities to his advantage. However, the neutron bomb died a slow political death in 1978 because, in an abstract sense, it was seen as "more immoral" than previous nuclear weapons simply because of greater efficiency at killing people and not things.[17] According to Zbigniew Brzezinski, President Carter could not bring himself to support deployment of ERWs in Europe:

> The President said, in effect, that he did not wish to go through with it; that he had a queasy feeling about the whole thing; that his Administration would be stamped forever as the Administration which introduced bombs that kill people but leave buildings intact; and that he would like to find a graceful way out.[18]

One of ERWs' inventors, Samuel Cohen, who wrote passionately in defense of ERWs in 1978, found himself doubting their morality and legitimacy in his later writings.[19]

Forced Defensive/Reactive Use of Theater Nuclear Weapons. The most probable scenario for use of theater nuclear weapons is in a forced defensive or "reactive" posture. The scenario most frequently discussed in the post-cold war era is use of theater nuclear weapons in response to chemical or biological attack. This scenario is particularly relevant following the U.S. Senate ratification and implementation of the Chemical Weapons Ban Treaty in April 1997 and is consistent with current joint doctrine which states "**A selective capability of being able to use lower-yield weapons in retaliation** [to weapons of mass destruction], without destabilizing the conflict, **is a useful alternative** for the US National Command Authority (NCA)."[emphasis original][20] The scenario envisions a limited nuclear strike against an adversary who employs other weapons of mass destruction against friendly forces, population centers or, possibly, vital infrastructure (water or food stores). Speculation regarding the use of nuclear weapons in the Persian Gulf Conflict frequently surfaced as a potential coalition response to a postulated use of chemical or biological weapons by Saddam Hussein. Nonetheless, many maintain it, too, was not feasible. Dowler and Howard explain:

> Another major reason for rejecting a nuclear response to Iraq was the argument that the destructive power of **available** [emphasis added] nuclear weapons is so great that the peace-loving societies of the world, including our own, might perceive such use as disproportionate to the attack that provoked it....The American population was dismayed when an attack with an accurate conventional weapon against an Iraqi command bunker in Baghdad resulted in the death of dozens of civilians. They probably would have not tolerated nuclear destruction of vast urban areas in response to Iraqi chemical attacks on our troops.[21]

Paul Nitze further maintains that, in general, "The United States cannot rely on its nuclear weapons to deter attacks with chemical, biological or conventional weapons....The prospect that a nuclear weapon would be used in response to such attacks is too dubious for deterrence to be reliable."[22]

Reactive employment of theater nuclear weapons in response to overwhelming conventional force as an act of desperation--our back to the wall--is also probable. Although defeat may appear imminent, such employment would be politically viable only when the theater

military objective is extremely significant and of paramount national importance, or the loss of life would be otherwise great. "... [A] U.S. President is highly unlikely to allow U.S. forces to face annihilation if a nation were to use nuclear weapons against those forces. The American people would not stand idly by and allow the destruction of U.S. forces by a renegade regime believing that the use of TNWS [tactical nuclear weapons systems] could have altered the situation."[23]

Use of theater nuclear weapons to respond to an enemy's first use of such weapons is also a conceivable scenario, especially when the adversary has limited his own employment to low numbers or yields. At this point, escalation considerations (not the subject of this paper) become the predominant factor in the decision to respond in kind.

In summary, there are numerous operational scenarios and tactical situations in which the use of theater nuclear weapons would provide an advantage to an operational commander, provided he is willing to suffer, or has adequately planned to compensate for, all disadvantages.

Operational Consequences of Theater Nuclear Weapon Use

> *"**The immediate and prolonged effects of WMD ... pose unprecedented physical and psychological problems for combat forces and non-combatant populations alike. Not only must U.S. forces be prepared to survive** and perhaps operate in a WMD environment for long periods of time, **they must also have effective, sustained C^4I to accomplish their missions**. [emphasis original]"*[24]
>
> Joint Pub 3-12

The utility of theater nuclear weapons in terms of the relevant components of operational design (desired end state, objective, direction (axis), guidance and applicable individual elements of operational idea (scheme)) will be analyzed in an effort to determine if the operational commander's objectives are best supported.

Desired End State. The impact of theater nuclear weapon use on a commander's desired end state presents the greatest concern. Joint doctrine states "JFCs [Joint Force Commanders] continuously assess the impact of current operations during hostilities on the terminal objectives. The outcome of military operations should not conflict with the long-term solution to the crisis."[25] The situation following the use of theater nuclear weapons, even without retaliation or escalation, almost always conflicts with the ultimate establishment of virtually all reasonable end states, especially in modern coalition-based regional wars where U.S. interests are typically economic.

Theater Political Consequences. The theater political consequences to the operational commander's end state will be examined first and some of the more tangible battlefield effects will be discussed later. Unity of effort may suffer seriously in three main support "arenas" because of theater use of nuclear weapons. Following deliberate use of nuclear weapons, support may be lost from the indigenous population (possibly affecting host nation support), the international community/coalition (if formed) and the American population (possibly affecting national will). Civilians, who had the misfortune of enduring nuclear detonation alongside military forces, will be less able to tolerate the increased stress and trauma than their military companions. They can be expected to become less self-sufficient (especially upon learning of the impact on their food supplies) and more in search of a target for their emotions.[26] Furthermore, if the basis for the war was tenuous to start with, the perception of lack of *jus in bello* (just use of force) may be fatal and lead to a loss of legitimacy.

Also of major concern is the selective preservation of enough enemy authority, command and control to actually terminate the conflict. The enemy's theater and/or national strategic command and control must remain intact to make reasonable decisions and transmit them to subordinate commanders. In his essay, "Flexible Targeting, Escalation Control and U.S. Options," Leon Sloss lists one military requirement for effective war termination as "...a survivable and responsive command, control, communications and intelligence (C^3I) apparatus...,

one that permits the National Command Authority (NCA) to assess the situation with reasonable accuracy...and to communicate orders to remaining commanders and forces, including orders to cease fire when required."[27] Physical destruction of both equipment and personnel from theater nuclear weapons may render the enemy's systems inoperable or severely degraded.

Environmental, Ecological and Physiological Effects. The environmental, ecological and physiological effects of nuclear detonations on the battlefield will be significant and must be carefully weighed against the gains. Following the detonation(s), the affected area will be virtually uninhabitable. Gross levels of contamination can be expected on the ground, in water and in the air.[28] Water will be undrinkable, indigenous food inedible, protective clothing will be required of all personnel and air filtration will be required for all closed buildings and vehicles.

The radiation levels from residual contamination and secondary activation of irradiated substances will be significant and, in relatively short periods of time, result in large doses to personnel.[29] Although the onset of symptoms varies dramatically based upon individual resistance, dose location, temporal distribution and radioactive energy level, personnel will begin to experience the readiness-impacting physiological effects of radiation (blood chemistry changes, fatigue, immunosuppression, skin disorders, vision degradation, etc.) if they remain in contaminated areas for extended periods of time.[30]

The physical destruction (leveling) of the terrain near ground zero as a result of blast effects may be of concern if it was previously irregular, provided effective cover or possessed other features offering tactical utility. Tree blow-down from blast may extend for hundreds of miles from ground zero. Furthermore, uncontrollable fire may occur depending on the vegetation pattern, climate and time of year. In general, secondary effects similar to those experienced following more severe natural disasters are likely to be experienced such as epidemic outbreaks (due to poor sanitation), microclimate changes and severe erosion, flooding or silting.[31] Such chaos will seriously debilitate the mobility and agility of friendly forces.

Logistics and Infrastructure Impacts. In the electronic age, the impact of EMP is the greatest unknown factor associated with use of any nuclear weapon. Both fission and fusion nuclear detonations produce massive pulses of electromagnetic radiation which have the potential to permanently damage all silicon-based solid state electronic components, including the erasure of all firmware-based storage systems (ROM, EPROM, etc.). The magnitude of the pulse can be quantified, yet the actual influence it would have, on everything from satellites to airplanes to telephone switching systems to microwave receivers to motor vehicles to wristwatches to munitions detonators--especially as effects on the equipment apply to their warfighting capability --has not been accurately determined in a manner to be of operational utility. The damage can be amplified by employing high-altitude bursts. Accordingly, EMP magnitude can be reduced by lowering the burst height, but lower burst heights will also serve to increase blast effects and increase collateral damage.[32]

A detailed listing of all possible effected systems or components is beyond the scope of this paper. This immense variable--the risk that modern means of warfighting could be shutdown indefinitely--in itself would dismay even the most optimistic operational commander from such a gamble. EMP can impact battle logistics if the indigenous infrastructure is relied upon to facilitate operations. For example, services such as local telephone, microwave or radio transmission or modern civil facility electronic control circuits may be permanently disrupted well beyond the perimeter of physical destruction.

In addition to the EMP, nuclear blasts, especially at high altitudes, cause "radio wave black-outs" in the vicinity of the blast due to massive disturbance of atmospheric composition and stratification. Following a blast, the area will be impenetrable to most radio wave high frequency (HF) and above for up to several hours, hampering both friendly and enemy C^3I plus friendly signals intelligence (SIGINT), communications intelligence (COMINT) or electronics intelligence (ELINT) collection. The exact magnitude, duration and effected frequency range will depend on blast size and burst height.[33]

Other consequences of nuclear blasts can dramatically impair mobility by destroying or damaging infrastructure. Damage to or loss of terminals, roads, bridges, ports or tunnels can hamper the ability of friendly forces to occupy affected territory.

Psychological Effects. The psychological effects on friendly forces must also be considered. Stress levels can generally be expected to rise dramatically due primarily to anxiety and worry over several new issues. Troops will be prone to worry about the effects of radiation and contamination, primarily because their understanding of what it is, how it effects them and how to counter it is incomplete. They are also likely to be anxious over the ethical issues surrounding the use of nuclear weapons. The answers to questions like "Will it lead to escalation and global nuclear war?", "Will the local population turn against use now?" or "What will the folks at home think of us now?" are not readily available in the foxholes, but may be partially provided in thorough advance training. When the decision is made to employ theater nuclear weapons in proximity to an operational commander's friendly forces, it can be expected their mental efficiency will degrade (beyond physiological effects discussed above) due to increased stress and psychological casualties may increase in number.[34]

Objective. The impact theater nuclear weapon employment would have on a commander's ability to achieve stated objectives must be considered. In general, any operational objective which begins with "destroy..." can be readily accomplished with a theater nuclear weapon. However, use of a theater nuclear weapon to achieve any operational objective which starts with "capture...", "secure...", "reagin/reclaim...", etc. is almost certain to prove counterproductive because there may not be much left to possess when the objective is achieved.

If theater nuclear weapons are used in a defensive role, original operational military objectives may have to be temporarily suspended or forsaken entirely. Such a curtailment may be mandated after the reactive first use to allow prompt negotiations for a peaceful cease-fire

to stem immediate escalation.[35]

In assessing the extent to which objectives have been attained, the accuracy of BDA becomes even more critical. Because some degree of restraint (small numbers and yields) is normally associated with the use of theater nuclear weapons, it would not be prudent to always assume a target has been completely destroyed in a single attack. Similarly, the overestimation or exaggeration of damage, either deliberate or inadvertent, typical of most recent conflicts, could prove disastrous to popular or coalition support (legitimacy) if it imparts the impression that collateral damage was excessive or the force employed was heavily disproportionate.

Direction (Axis). The operational direction (axis) may be or need to be altered following the use of theater nuclear weapons. As discussed earlier (environmental, ecological and physiological effects), portions of the battlespace may be virtually impassable for some time after the attack; others only immediately impassable, then later with extreme difficulty. Therefore, if the magnitude of the battlespace affected by the blast(s) is significant compared to the total battlespace, the direction (axis) of attack may need to be altered to accommodate the dramatic change in the operational factors space and, hence, time. The effects would be particularly dramatic if extreme inhomogeneity of terrain (mountains adjacent to desert adjacent to plains, etc) had been a significant factor in the commander's operational scheme prior to the attack. Conversely, the devastating effects of a sizable nuclear blast could render a previously impassable area passable (the ultimate napalm) and open a new, more advantageous axis of attack (attacker) or, alternately, expose new flanks or rears (defender).

Guidance. The requirement for clear, concise and insightful guidance at all levels of warfare is not significantly altered by the introduction of nuclear weapons to a theater. There currently exists sufficient joint and service-specific doctrine for the employment of theater nuclear weapons. Furthermore, Chapter V of Joint Publication 3-12.1, *Joint Doctrine for Theater Nuclear*

Operations, provides very firm direction to geographic combatant commanders to formulate, in company with USSTRATCOM teams, detailed operational employment and contingency plans, plus target packages and priorities, to support theater nuclear operations. A list of nine planning criteria are also given in support of this tasking.

Yet, more could be written on how to minimize collateral damage and/or work around the weapons effects after employment. Chapter II of Joint Publication 3-12, *Joint Doctrine for Nuclear Operations* provides a figure (Figure II-3) listing in general terms the action required to mitigate the effects of WMD. Chapter III of Joint Publication 3-12.1 lists five rather obvious targeting techniques for reducing collateral damage and emphasizes that minimizing the possibility and extent of such damage is a joint force command level and USSTRATCOM responsibility. It then refers to a classified publication, "Joint Publication 3-12.2, *Nuclear Weapons Employment Effects Data*", which does not appear to be as yet approved, but is available in draft form. When issued, this publication will provide the type of information needed by an operational commander to fully and accurately weigh the consequences of theater nuclear weapons use (including minimum safe distance (MSD) for friendly forces) against essential military necessity without pouring over the numerous research reports and technical data to which he is directed on page II-7 of Joint Pub 3-12.

Operational Idea (Scheme). Although there are 18 commonly listed elements of operational idea, only a few are relevant to the use of theater nuclear weapons and will be discussed herein. Overall, the point of main attack, method of defeating the opponent and application of forces and assets will be dramatically different when theater nuclear weapons are used. Battlefield re-shaping effects discussed in detail above, either as a form of operational fire before the operation or as supporting fires during the operation, must be accommodated. In addition, prior assumptions and intelligence about the battlefield itself will no longer be valid and a substantial intelligence effort will be required to provide input on the best subsequent course of action.

Thus, the use of theater nuclear weapons will so markedly change the original scheme, that operational plans must contain appropriate branches and sequels which account for their use.

Operational Deception and Security. Operational deception and security (OPDEC and OPSEC) will most likely be impacted by a decision to employ theater nuclear weapons. For example, Joint Pub 3-12 lists advance warning of personnel as an action which will serve to mitigate WMD effects (Figure II-3) and an entire section in Chapter IV of Joint Pub 3-12 is devoted to the description of warning procedures. Both recognize that, while advance warning of theater nuclear weapon use will reduce friendly or neutral collateral damage and somewhat mitigate the reduction in warfighting capability, OPSEC will most likely be compromised in the process. Compromise would be especially likely if an effort were made to inform all friendly and neutral aircraft (very susceptible to EMP) in the vicinity of the blast zone or inform cooperating non-government organizations (NGOs) and private volunteer organizations (PVOs) which may be operating in country. Correspondingly, all elements of OPDEC employed up to that point will most likely be negated as enemy intelligence detects friendly forces and neutral personnel evacuating a specific area and taking nuclear-specific precautions.

Regeneration of Combat Power. Combat power may be regenerated during and immediately after the use of theater nuclear weapons. Both belligerent sides will experience a form of "operational pause"--whether they need it or not--while the dust settles. For the theater nuclear weapon user, the pause will be intentional and its need may have been the very reason for employment of the weapons. For the recipient, the pause will be unanticipated and will most likely not be effectively utilized. Therefore, if theater nuclear weapons are used from a position of prior advantage, it is imperative that friendly forces push the battle forward to capitalize on the nuclear attack rather than let the enemy regenerate his forces after the nuclear attack. Conversely, if the nuclear attack was initiated from a position of weakness, the primary focus for

friendly forces must be to regenerate during and immediately after the attack and maintain the now favorable operational momentum created by the defensive nuclear attack. However, if it is expected that the enemy will retaliate, the need to disperse forces in preparation for nuclear attack may defeat efforts to concentrate combat effects for follow-on attack by friendly forces.

CONCLUSION

Many aspects of modern warfighting on and around a nuclear battlefield have not been sufficiently resolved to allow confident employment of theater nuclear weapons as a mere subset of a major operational plan. Effectively dealing with large areas of total contamination is difficult and may require personnel protection for days or weeks. The ability of large numbers of soldiers generally-trained in radiological controls to effectively fight in such a highly contaminated, barren environment has yet to be proven. Furthermore, until the effects of a massive EMP on modern warfighting equipment can be accurately assessed, deliberately subjecting friendly equipment to such a pulse is extremely precarious.

When compared to the operational advantages of employing theater nuclear weapons, the detrimental effects of these weapons override their battlefield effectiveness. In most cases, the negative effects on the operational commander's ability to affect orderly war termination and achieve national strategic and military strategic objectives in his theater, particularly in today's coalition-based environment, will strongly outweigh the potential advantages. The use of theater nuclear weapons could seriously hamper a commander's ability to employ operational art <u>and</u> achieve a palatable end state in his arena. Use of such weapons will most likely lead to either escalation or retaliation, but probably not to rapid conflict resolution by reasonable means.

Therefore, the basic capability for theater employment of nuclear weapons should be retained. However, the level of effort in planning and training for theater nuclear weapon employment at all levels of command and applicable platforms/units should be scaled-back commensurate with the likelihood of their use in each theater.

NOTES

1. U.S. Department of Defense, Doctrine for Joint Nuclear Operations, Joint Publication 3-12 (Washington: 15 December 1995), p viii.

2. The President, A National Security Strategy of Engagement and Enlargement (Washington: U.S. Government Printing Office, February 1996), 21 and U.S. Congress, Senate, Committee on Armed Services, Briefings on Results of the Nuclear Posture Review, Hearings (Washington: U.S. Government Printing Office, 1994), 15-17.

3. U.S. Congress, Senate, Committee on Armed Services, Military Implications of START I and START II, Hearings (Washington: U.S. Government Printing Office, 1992).

4. The distinction between "strategic" and "non-strategic" nuclear weapons has historically been faint, as evidenced by the numerous names assigned to the two groups. Additionally, some sources attempt to distinguish between "tactical" and "theater" nuclear weapons along lines corresponding to levels of warfare or distance from the forward edge of the battle area (FEBA). This distinction is extremely weak in modern warfare as any "tactical" use of nuclear weapons will clearly have theater-wide implications. Therefore, throughout this paper, as in current U.S. joint publications, the term "theater nuclear weapons" will be used synonymously for what has been described as "non-strategic", "theater", "battlefield" or "tactical" nuclear weapons in other publications. For this discussion, "theater nuclear weapons" will be assumed to include **any** form of nuclear weapon used in a limited manner in direct support of a single operational commander undertaking a major military operation in a confined area of responsibility. Consequently, this definition may include nuclear-tipped TOMAHAWK cruise missiles, intermediate range nuclear missiles or submarine-launched ballistic missiles **if so employed**.

5. In accordance with joint doctrine, geographic combatant commanders ("CINCs") have primary responsibility for planning, requesting and implementing the use of theater nuclear weapons within their theaters. However, the term "operational commander" will be used throughout this paper to emphasize that the perceived necessity to employ theater nuclear weapons is most likely to originate at the corps level or below, and that once "blanket" release authority has been granted by the National Command Authority (as discussed later as an assumption), the detailed decision of how and when to employ theater nuclear weapons could be delegated to as low a level as battalion commanders.

6. Milan Vego, "Operational Art", Unpublished Paper (NWC 4090), U.S. Naval War College, Joint Military Operations Department, Newport RI: August 1996, 3.

7. Stephen J. Cimbala, Nuclear War Termination: Concepts, Controversies and Conclusions, Working Paper no. 186 (Canberra, Australia: The Strategic and Defence Studies Centre, June 1989), 9.

8. The tenets of operational design will be limited in this paper to the context of land or littoral operations. Although tactical nuclear weapons could be employed in "blue water" naval operations, the collateral damage concerns in that case apply strictly to damage to friendly forces. Careful consideration of well-published nuclear warhead minimum safe distances (MSDs) will eliminate undesirable effects in most instances of open ocean use.

9. For the purpose of this paper, "collateral damage" will include any damage to terrain, forces, equipment, facilities or persons other that the deliberately designated target.

10. Emmett E. Stobbs Jr., Is There a Future Role for Tactical Nuclear Weapon Systems in the National Military Strategy? (Carlisle Barracks, Pennsylvania: U.S. Army War College, Military Studies Program Paper, 3 April 1992), 14.

11. Thomas W. Dowler and Joseph S. Howard II, "Countering the Threat of the Well-Armed Tyrant: A Modest Proposal for Small Nuclear Weapons," *Strategic Review*, Fall 1991, 36.

12. Citing other sources in Nuclear War Termination: Concepts, Controversies and Conclusions (page 4), Stephen Cimbala notes that, "The time it would supposedly take a corps commander's request to work its way up the NATO chain of command, to receive the appropriate approvals, and to find its way back down again may take as many as sixty hours." Such a delay may or may not be appropriate, given the gravity of the circumstances. In fact, later (page 37), when describing the effect of friction on nuclear war, he states "The role of the President and the national security advisors, including the topmost committee of military advisors embodied in the Joint Chiefs of Staff, is to slow down the pace of events instead of speeding them up."

13. Joint Pub 3-12, p III-4.

14. Stobbs, 12.

15. Richard A. Paulsen, The Role of U.S. Nuclear Weapons in the Post-Cold War Era, (Maxwell Air Force Base, Alabama: Air University Press, 1994), 71.

16. The relative physical effects of a nuclear explosion are a function of the warhead design. Thus, the relative proportion of energy dissipated via nuclear effects (radiation) and physical effects (intense heat, light, sound and associated consequences) may be altered if one effect is considered more desirable than others. In a traditional fission warhead, approximately 85% of the energy released contributes to blast effects. The neutron bomb warhead is designed to maximize the instantaneous radiation upon explosion, while reducing the blast effects, by using a small fission reaction to precipitate a large fusion reaction. Typical fusion designs were calculated to reduce the blast force by a factor of ten for a given (constant) radiation level upon explosion. Furthermore, virtually no radioactive isotopes are produced by most fusion warhead designs, eliminating the long-term problems of radioactive contamination, fallout and rain-out which account for about ten percent of the energy of a standard fission blast. For greater detail, see Sam T. Cohen, The Neutron Bomb: Political, Technological and Military Issues (Cambridge, MA: Institute for Foreign Policy Analysis, Inc., November 1978), 66-70, 80-83.

17. Ibid, pp x and 75 through 80.

18. Zbigniew K. Brzezinski, Principle and Power: Memories of the National Security Advisor, 1977-1981 (New York: Farrar, Straus and Giroux, 1983), 304-305.

19. Samuel T. Cohen, The Truth About the Neutron Bomb: The Inventor of the Bomb Speaks Out (New York: William Morrow and Company, 1983.

20. Joint Pub 3-12, p I-3.

21. Dowler and Howard, 36.

22. Paul H. Nitze, "Keep Nuclear Insurance", *The Bulletin of Atomic Scientists*, May 1982, 34.

23. Stobbs, 17.

24. Joint Pub 3-12, p II-7.

25. U.S. Department of Defense, Doctrine for Joint Operations, Joint Publication 3-0 (Washington: 1 February 1995), page III-19.

26. U.S. Department of the Army, Human Resources Research Office, Human Factors in Tactical Nuclear Combat, Technical Report 65-2, (Alexandria, VA: April 1965), 35-38.

27. Leon Sloss, "Flexible Targeting, Escalation Control and U.S. Options" in Ending a Nuclear War: Are the Superpowers Prepared?, Stephen J. Cimbala and Joseph D. Douglass, Jr., ed., (Washington: Pergamon-Brassey's, 1988), 3.

28. For example, a 1 mega-ton blast (surface burst) is nominally capable (depending on wind and variable over time) of producing a surface contamination level of $75 mCi/mi^2$ ($29,000 uuci/100cm^2$) over an area of $10,500 mi^2$ (60 mi radius circle). See Hudson Institute, Environmental Effects of Nuclear Weapons, HI-518-RR, Volume I, (Harmon-on-Hudson, NY: December 1965), page 1-11 for more detail.

29. In the above example, the general area radiation level associated with $75 mCi/mi^2$ (soluble Sr-90) is no less than 3 REM/hr after one hour. (Ibid.) According to 10 CFR (Code of Federal Regulations), the legal occupational exposure limit in REM is equal to five times a person's age minus 18 years [5(age-18)]. In the above example, a typical 20 year old soldier would exceed his legal occupational exposure limit in about four hours.

30. U.S. Department of Defense, Defense Technical Information Center, Human Response to Nuclear and Advanced Technology Weapons Effects, ADA309511 (Fort Belvoir, VA: May 1996), 3-20. In the above example of 3 REM/hr out to 60 miles, the soldier may begin to experience early somatic effects in just over four days, however, the exact lethality of his dose (i.e., how long until he dies) cannot be accurately assessed because 3 REM/hr is a relatively moderate dose rate. Note however, that if the original distance were constrained to a 36 miles radius vice 60, the expected dose rate would be ten times higher and the onset of symptoms would be correspondingly faster. Also, wind dispersion effects are dramatic; a constant wind as little as 15 knots can produce a fallout swath 280 miles long, but only 40 miles wide, in 18 hours for a one megaton ground blast. The total dose at which 50% of a human population will ultimately die from radiation-related symptoms is generally accepted to be 450 REM, but varies widely with the type/energy of the radiation and the dose rate.

31. Hudson Institute, Chapter IV.

32. Dr. Bruce D. Clayton claims in Life After Doomsday: A Survivalist Guide to Nuclear War and Other Major Disasters (Boulder, CO: Paladin Press, 1980, page 27) that "High altitude megaton tests in the Pacific knocked-out emergency communications and city power in Hawaii over *750 miles away*. [emphasis original] Calculations show that it will be possible for the Soviets to explode one large bomb high over Omaha, Nebraska, and disrupt electrical equipment from coast to coast." More specifically, the EMP for a 400 km yield-independent, high-altitude blast can expose equipment to fields as great as 50,000 volts/meter out to 2,200 km. Military electronic equipment which has been hardened against radar and microwave transmitters can typically withstand fields in the hundreds of volts/meter. See Charles S. Grace, Nuclear Weapons: Principles, Effects and Survivability (London: Brassey's, 1994), pages 96-98 for a more detailed technical description.

33. U.S. Department of Defense, Nuclear Weapons Employment Effect Data, Joint Publication 3-12.2 (Washington: undated first draft).

34. U.S. Department of the Army, Human Resources Research Office, Human Factors in Tactical Nuclear Combat, Technical Report 65-2, (Alexandria, VA: April 1965), p vi and U.S. Department of Defense, Doctrine for Joint Theater Nuclear Operations, Joint Publication 3-12.1 (Washington: 1 February 1996), p III-8.

35. This concept is discussed in U.S. Department of Defense, Defense Technical Information Center, Analysis of the 1985 Tactical Nuclear Land Battle, DTIC Technical Note SSC-TN-2240-32 (Alexandria, VA: January 1974), page 47.

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